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NIF S600D Snout Final Design Review (FDR) Report

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January 21st, 2015

TO: Perry Bell

FROM: Robin Hibbard

SUBJECT: NIF S600D Snout Final Design Review (FDR) Report

Introduction

The S600D is a one or two channel mirror spectrometer which will provide temporal and spatial soft x-ray data in a single NIF shot. It mounts to the existing DIM Imaging Streak Camera (DISC) using the standard NIF kinematic mount design. LLE and LLNL each have responsibilities for the snout.

The Laboratory for Laser Energetics (LLE) is subcontracted to design, fabricate, and align the S600D Snout at the OMEGA Laser facility in Rochester, NY before delivery to LLNL. The Snout consists of the Mirror Mount, Kinematic interface to DISC, Slit mount, and filter pack mount. Lawrence Livermore National Laboratory (LLNL) is responsible to fabricate and deliver the Mirror substrates and coatings, Pinhole slits and collimators, Filter material, and Image plates. LLNL is also responsible for the Requirements Definition, Concept of Operations, Debris and Shrapnel analysis, Stakeholder reviews and Integration in the NIF Facility.

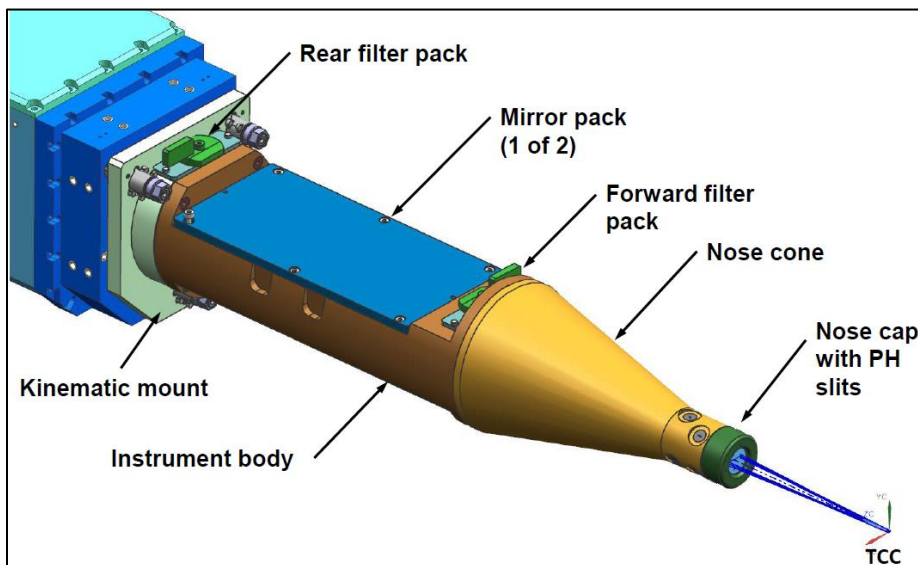


Figure 1. S600D on DISC



Summary

The S600D snout provides temporal and spatial soft x-ray data from sources up to 3.0 mm in length, 100 to 500 eV with a spatial resolution of less than 90 μm , and an alignment tolerance of 250 μm in DIM 90-78 (500 μm in DIM 0-0). It mounts to the existing DIM Imaging Streak Camera (DISC) using the standard NIF kinematic mount design, will be installed through the side-access ports on a DIM, the design allows for the image plates and filter to be removed with the snout installed. The mirrors and pinhole slits are not LRU s and must be removed in the TD Factory.

The Conceptual Design Review for S600D was held November 5, 2014. The Final Design Review was held January 15 2015. The team was well prepared for the review and the design is complete. The Review Committee has reviewed the material presented and determined the team is authorized to fabricate and deliver the S600.

Review Scope

The review committee was asked to review the state of the final design. The assessment was made of the following items:

- Were the design inputs correctly selected, requirements in RMS, Interfaces identified and all incorporated into the design?
 - The appropriate design methods appear to be used.
 - The design output is reasonable.
 - Risk consequences have been incorporated into the design.
 - Requirements have been approved in RMS.
 - Verification strategies developed and are part of the RMS.
 - Assumptions are adequately described and reasonable.
- There are no Configured systems for S600D.
- Computer Programs for design and the debris wind/shrapnel analysis will be standard as used for other snouts
- R&D was not necessary for the development of this diagnostic.
- Qualified, standard, approved materials are being used.
- Schedule constraints are understood and adequate contingency exists.
- Costs for fabrications are understood and within fiscal constraints.

Findings / Action Items

The review team submitted the attached action items from the review. There were 4 action items identified; 2 type 1, 2 type 2 and 0 type 3. Three of the four action items are already closed. For a listing see **Table 1**.

Note: two other items are unfinished but should not delay the completion of this as they were FDR deliverable and are in progress.

- The completed drawing package needs to be transmitted to LLNL.
- The Cad Model verification at LLNL.

Design and Review Teams

The Design Team and Reviewers List are shown in Table 2.

**Attendees**

Attendees list is attached to this memo as Attachment 1.

Conceptual Design Review Reference

S-600D NIF Conceptual Design Review document, **NIF-0176026**, of the CDR review is available upon request.



Table 1 CDR Action Items

N o	Type	Assigned by	Description	Assigned to	Response	Status
1	1	Kohut/ Hibbard	Verify the ATLAS retro's are shielded. View graph 42 shows the ATLAS vectors; VG 45 shows the cone of light off TCC and a side view of the protected top and bottom surfaces. Can you add the cone to VG42 and add another image like VG 45 with a top view of the shielded sides?	Bedzyk	Front retro-reflectors were moved back ~1 in to ensure that they are shielded by nose cone. Viewgraphs with requested views were provided.	Closed
2	2	Kohut	Investigate the need to add a hole for a locating pin to allow the keying the locations of the ATLAS retro's to the snout body.	Ahmed	Two pins have been added to each side of the instrument's body to locate future ATLAS brackets.	Closed
3	1	Moore/Hi bbard	Verify the tolerance stack up on the off-line alignment fixture is adequate to verify the .188 mm mirror position requirement on the mirror location. I.e. what error is in this measurement?	Bedzyk	The alignment fixture tolerance stack-up has been rolled into the total alignment error budget	Closed
4	2	Hibbard	Is characterizing one location on each substrate sufficient to quantify the surface quality?	Ahmed	Substrates will be ground and polished in batches of 4. Resulting flatness and roughness are expected to be uniform throughout batch. One measurement from each mirror will provide 4 measurements from the batch. If any of the measurements are not consistent with the others, additional locations will be characterized.	Closed
5						

Table 2 Design Team and Committee Reviewers

Design Team

Maryum Ahmed
Mark Bedzyk
Robin Hibbard
Tony Agliata
Alastair Moore
Sean Regan
James Benstead
Milt Shoup

Area

Project Engineer
Project Engineer
System Engineer
System Engineer,
Responsible Scientist
Responsible Scientist
Campaign Responsible Individual
ME Group Leader, LLE

Org

LLNL
LLE
LLNL
LLE
LLNL
LLE
AWE
LLE

Review Team

Robin Hibbard
Tom Kohut
Tim Sarginson
Shannon Ayers
Bob Kauffman
Bill Gourdin
Reg Wood
Nan Wong

Area

ME / CDR Chair / Target Diagnostics
Operations
Shot setup
System Engineering
TD Senior Scientist
Cleanliness
Alignment/TaLIS
Optics

LLNL
LLNL
LLNL
LLNL
LLNL
LLNL
LLNL
LLNL



Jim Wright	Target Diagnostic Factory	LLNL
Jim Cox	DIM Operations	LLNL
Milt Shoup	ME, LLE	LLE
Reg Wood	Alignment	LLNL

Other Invitees

Perry Bell	Target Diagnostics	LLNL
Biesiada, Tom	LSEO division	
Pardini, Tom	Optic Scientist	LLNL
Hau-Reige, Stefan	Optic Scientist	LLNL
Ehrlich, Bob	Operations	LLNL
Miller, Mark	Classification	LLNL
Smith, Cal	Target Diagnostics Analysis	LLNL

Tietbohl, Greg	Target Area	LLNL
Lee, Tony	TD Design Lead	LLNL
Baker, Kevin	RS, Campaign	LLNL
Soufli, Regina	Coating Scientist	LLNL
Hatch, Ben	DISC RSE	LLNL

Other Invitees

TaLIS
TaDA



Signatures:

Robin Hibbard, Chairman

Maryum Ahmed, RI

Tom Biesiada, LSEO



Attachment 1: Attendance Roster